

Name: \_\_\_\_\_

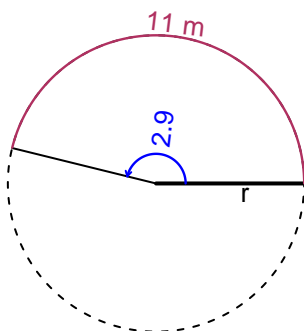
Date: \_\_\_\_\_

## Trig Final (SLTN v670)

- You should have a calculator (like [Desmos](#)) and a [unit-circle](#) reference sheet.

### Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The angle measure is 2.9 radians. The arc length is 11 meters. How long is the radius in meters?

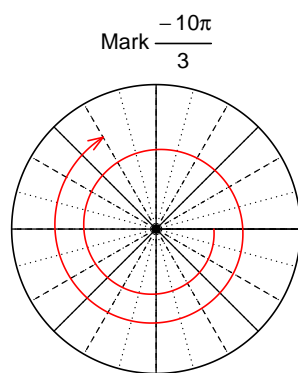


$$\theta = \frac{L}{r} \quad r = \frac{L}{\theta} \quad L = r\theta$$

$r = 3.793$  meters.

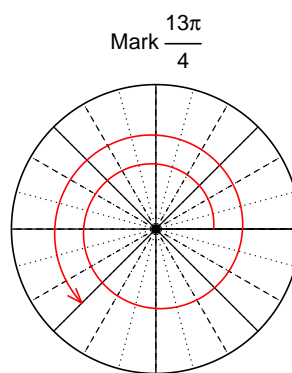
### Question 2

Consider angles  $-\frac{10\pi}{3}$  and  $\frac{13\pi}{4}$ . For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for  $\sin\left(-\frac{10\pi}{3}\right)$  and  $\cos\left(\frac{13\pi}{4}\right)$  by using a unit circle (provided separately).



Find  $\sin(-10\pi/3)$

$$\sin(-10\pi/3) = \frac{\sqrt{3}}{2}$$



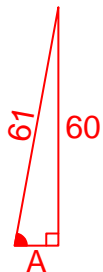
Find  $\cos(13\pi/4)$

$$\cos(13\pi/4) = \frac{-\sqrt{2}}{2}$$

### Question 3

If  $\sin(\theta) = \frac{-60}{61}$ , and  $\theta$  is in quadrant IV, determine an exact value for  $\tan(\theta)$ .

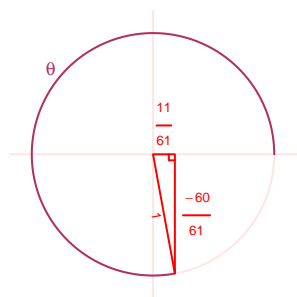
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$\begin{aligned}A^2 + 60^2 &= 61^2 \\A &= \sqrt{61^2 - 60^2} \\A &= 11\end{aligned}$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant IV in a unit circle.



$$\tan(\theta) = \frac{\frac{-60}{61}}{\frac{11}{61}} = \frac{-60}{11}$$

### Question 4

A mass-spring system oscillates vertically with an amplitude of 6.29 meters, a midline at  $y = -4.89$  meters, and a frequency of 8.29 Hz. At  $t = 0$ , the mass is at the maximum height. Write an equation to model the height ( $y$  in meters) as a function of time ( $t$  in seconds).

Any of these equations would get full credit.

$$y = 6.29 \cos(2\pi 8.29t) - 4.89$$

or

$$y = 6.29 \cos(16.58\pi t) - 4.89$$

or

$$y = 6.29 \cos(52.09t) - 4.89$$